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8. The article below has been attached as Exhibit A to this declaration:

A.	J.F. Tilki; A.A. Beex; “Encoding a hidden auxiliary channel onto a digital audio signal using psychoacoustic masking”, Proceedings IEEE SOUTHEASTCON '97. 'Engineering the New Century', April 12 – 14, 1997.
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9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE’s business. Exhibit A is a true and correct copy of the Exhibit, as it existed on or about July 13, 2022.

10. The article and abstract from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication.
11. J.F. Tilki; A.A. Beex; "Encoding a hidden auxiliary channel onto a digital audio signal using psychoacoustic masking" was published in the Proceedings of IEEE SOUTHEASTCON '97. 'Engineering the New Century'. IEEE SOUTHEASTCON '97 was held from April 12 – 14, 1997. Copies of the conference proceedings were made available no later than the last day of the conference. The article is currently available for public download from the IEEE digital library, IEEE Xplore.
12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 7/15/2022

DocuSigned by:  
*Gordon Macpherson*  
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# Encoding a hidden auxiliary channel onto a digital audio signal using psychoacoustic masking

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J.F. Tilki ; A.A. Beex All Authors



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#### Abstract:

We report on the development of a method of encoding an auxiliary channel onto a digital audio signal such that it is imperceptible to human observers. The encoding is accomplished by imposing slight and controlled changes on the phase spectrum of short-time signal windows. By employing principles of psychoacoustics the auxiliary channel is masked from human perception. Furthermore, the encoding and decoding are achieved via fast algorithms which allow real time processing. The method is applicable for any digitized audio signal containing voice, music, or other acoustic signals to be heard by humans. Possible signal sources include compact discs, digital television, digital radio, digital telephony, and any other source where an audio signal is in a digital format.

**Published in:** Proceedings IEEE SOUTHEASTCON '97. 'Engineering the New Century'

**Date of Conference:** 12-14 April 1997 **INSPEC Accession Number:** 5672553

**Date Added to IEEE Xplore:** 06 August 2002

**DOI:** 10.1109/SECON.1997.598705

**Publisher:** IEEE

**Print ISBN:**0-7803-3844-8

**Conference Location:** Blacksburg, VA, USA

J.F. Tilki

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